CLAIMS

What is claimed is:

1. A method of storing data on a storage medium and retrieving the stored data which includes the ability to predict readout errors when the stored data is retrieved, comprising:

interleaving the data with a plurality of reference fields, each reference field including a defined data pattern;

storing the interleaved data such that the reference fields are at predetermined locations;

upon demand, retrieving the interleaved data;

analyzing the retrieved interleaved data by testing the retrieved reference field to determine if the retrieved reference field meets a predetermined shape condition and a predetermined amplitude condition; and

determining whether readout errors have been encountered based upon the results of the interleaved data analysis.

2. The method of claim 1 further comprising the production of a reference status byte in response to the analysis step, the reference status byte including an amplitude bit and a shape bit to indicate compliance with the predetermined amplitude condition and the predetermined shape condition, respectively for the analyzed reference field.

3. The method of claim 1 further comprising the analysis of the reference bytes to perform operating parameter updates for the data storage system.

4. The method of claim 3 wherein the operating parameter updates include adjustments to a readout system in the data storage system so that a read signal offset is optimized.

5. The method of claim 3 wherein the operating parameter updates include adjustments to a readout system in the data storage system so that a read signal gain is optimized.

6. The method of claim 3 wherein the operating parameter updates include adjustments to a synchronization system within the data storage system so that optimum phase synchronization can be achieved between a readout signal and a storage media synchronization signal.

7. The method of claim 5 wherein the read signal gain is optimized by adjusting the readout system to maximize the resolution of the readout window so that the reading of the defined data in the reference field will fill substantially all of the readout window.

8. The method of claim 4 wherein the read signal offset is optimized by adjusting the readout system to maximize the resolution of the readout window so that the reading of the defined data in the reference field will fill substantially all of the readout window.

9. The method of claim 2 further comprising predicting the existence in data retrieval errors in the read data on either side of the reference field based upon the reference status byte.

10. The method of claim 1 wherein the data is stored on the storage media such that it can be arranged in a virtual matrix to allow for further error correction operations, and wherein the reference fields are arranged as a plurality of columns within the virtual matrix.

11. The method of claim 10 further comprising the production of a reference status byte in response to the analysis step, the reference status byte including an amplitude bit and a shape bit to indicate compliance with the predetermined amplitude condition and the predetermined shape condition, respectively for the analyzed reference field.

12. The method of claim 11 further comprising predicting the existence in data retrieval errors in the read data on either side of the reference field based upon the reference status byte.

13. A method of continuously controlling a plurality of operating perimeters and providing error correction capabilities for a data storage system, the method comprising:

storing data so that it is interleaved with a plurality of reference bytes, each reference byte including a defined data pattern and being placed at a predetermined location within the stored data;

reading the stored data and the interleaved reference bytes, and

based upon the defined data pattern of the reference bytes, adjusting operating parameters as necessary and performing error correction analysis.

14. The method of claim 13 wherein the step of error correction analysis includes analyzing the retrieved interleaved data by analyzing the retrieved reference bytes to determine if the retrieved reference bytes meets a predetermined shape condition and a predetermined amplitude condition; and predicting whether readout errors exist on either side of the reference byte based upon the results of the reference byte analysis.

15. The method of claim 13 further comprising the production of a reference status byte in response to the analysis of the reference byte, the reference status byte including an amplitude bit and a shape bit to indicate compliance with the predetermined amplitude condition and the predetermined shape condition, respectively.

16. The method of claim 13 further comprising initializing the data storage device by reading an initialization data pattern and adjusting the readout system to maximize the resolution of the readout window so that the reading of the initialization data pattern will fill substantially all of the readout window.

17. The method of claim 13 wherein the step of adjusting readout gain involves adjusting a gain window of a readout amplifier so that the readout of the predetermined pattern will fill substantially all of the gain window.

18. The method of claim 14 wherein the operating parameter is the read signal offset.

19. The method of claim 14 wherein the operating parameter is the read signal gain.

20. The method of claim 14 wherein the operating parameter is the phase synchronization of the data storage device read system.

21. The method of claim 14 wherein the operating parameter is the frequency synchronization of the data storage device read system.

22. A method of providing optimum read channel operation in a data storage device, the method comprising:

storing data on a storage media such that periodic reference fields are interleaved within the data, each reference field including a defined pattern; and

using the periodic reference bytes to update a plurality of operating parameters of the read channel and to provide a reference field status byte indicative of possible errors that exist in the data.

23. The method of claim 22 wherein one of the plurality of operating parameter is a read signal gain, wherein the read signal gain is adjusted to an optimum level depending on the results of reading the reference fields.

24. The method of claim 22 wherein one of the plurality of operating parameter is a read signal offset, wherein the read signal offset is adjusted to an optimum level depending on the results of reading the reference fields.

25. The method of claim 22 wherein one of the plurality of operating parameter is a read signal phase synchronization, wherein a read clock signal is adjusted to an optimum level depending on the results of reading the reference fields.

26. The method of claim 22 wherein the reference field status byte is obtained by comparing the amplitude and shape of a readout from the reference field with an expected readout signal, and the reference field status byte is indicative of whether the readout from the reference field matches the expected readout signal.

27. The method of claim 26 wherein the reference field status byte includes a first bit indicative of whether the amplitude of the readout from the reference field matches the expected readout signal.

28. The method of claim 27 wherein the reference field status byte includes a second bit indicative of whether the shape of the readout from the reference field matches the expected readout signal.

29. The method of claim 22 further comprising the performance of an error correction methodology, wherein the reference field status byte is utilized by the error correction methodology to provide efficient error correction.

30. The method of claim 28 wherein the reference field status byte includes further bits indicative of the amplitude of the readout from the reference field.

31. The method of claim 23 wherein the read signal gain is adjusted to an optimum level which allows for effective signal conditioning.